



# NRC NEWS

## U.S. NUCLEAR REGULATORY COMMISSION

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### **Regulatory Perspectives on the Nuclear Fuel Cycle**

**Platts**

**Nuclear Fuel Strategies:**

**Securing Fuel Supply, Managing Transportation and Storage**

**Washington, D.C.**

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**Peter B. Lyons**

**Commissioner, USNRC**

Chairman Nils Diaz was originally scheduled to join you today. I'm pleased to be with you today in his place. I'm hoping that my eight months of experience as a Commissioner will be sufficient to answer most of your questions, albeit not as well as the Chairman's extensive knowledge.

My goal for today will be to share with you my views on the Nuclear Regulatory Commission's (NRC) role in the future of nuclear energy utilization in the U.S. In keeping with the theme of your Conference, I will touch on all aspects of the nuclear fuel cycle.

There is no doubt in my mind that our nation will be challenged in meeting current and future needs for electricity generation. As we strive to meet this challenge, I believe that we should encourage fuel diversity in order to minimize pressure on limited supplies of natural gas, and to reduce our dependance on foreign energy sources.

For this new electricity generation, we need to tap renewables as much as possible. However, the intermittent character of solar and wind systems means that they can never play a dominant role in supplying baseload electricity, unless we invent new, very low cost energy storage systems. Our large coal reserve provides another opportunity for expanded baseload generation, but significant expansion of that resource will depend on development of cost effective, low emission plants. The only other source of significant new electricity generation within the next few decades is nuclear energy.

It's very evident that the nuclear power industry enjoys strong support from recent Administration and bipartisan Congressional actions. The recent visits of President Bush to Calvert Cliffs and of former President Carter to D.C. Cook, along with their endorsements for the future of nuclear power, help to underpin the growing national confidence in the important role that nuclear

energy can play. The President's signing of the Energy Policy Act of 2005 authorized a host of important new programs and opportunities for this industry, including production tax credits and loan guarantees. And the current versions of the House and Senate Appropriations Bills both provide strong support for nuclear energy, including increased funding for the NRC to perform security and new reactor licensing activities.

Support for nuclear power is also increasing from the environmental community. The founder of Greenpeace, Patrick Moore, recently testified before Congress that:

*"I believe the majority of environmental activists, including those at Greenpeace, have now become so blinded by their extremist policies that they fail to consider the enormous and obvious benefits of harnessing nuclear power to meet and secure America's growing energy needs."*

Other noted environmentalists, like James Lovelock and Bishop Hugh Montefiore, have made similarly strong statements.

While this support for nuclear energy certainly enhances the prospects for new domestic plant construction, any applicant taking that step will have to weigh a range of financial risk factors. Some of those financial risk factors involve the regulatory framework for nuclear power and thus directly involve the NRC. With that in mind, I'll turn to discussion of NRC roles in the fuel cycle.

I'll start with the mining and milling of uranium. NRC provides regulatory oversight to 16 uranium recovery licensees in various stages, including operational in-situ, remediation, and standby. Our key challenge in this area is resolving complex groundwater issues.

Despite the decommissioning and remediation activities that NRC regulates, I note an optimism in this sector which wasn't evident before. There are many reports of increased domestic and global exploration for new uranium deposits. While U.S.-mined uranium is now a very small fraction of our annual usage, this improved climate for new mining may lead to increased domestic interest in mining.

NRC licenses eight special nuclear materials facilities, including six fuel fabrication facilities and two gaseous diffusion enrichment facilities. While only the Paducah site is actively enriching product, NRC is experiencing a high level of activity in support of the future domestic fuel supply.

The first gas centrifuge application was received in February 2003 for USEC's Lead Cascade Facility. That application was approved in 2004. This facility is intended to provide a demonstration facility for USEC's American Centrifuge design. The Facility will consist of a number of centrifuges with a total possession limit of 250 kg of UF<sub>6</sub>. The only uranium withdrawals from the cascade will be in the form of samples.

We are reviewing licenses for two gas centrifuge applications and have issued a construction authorization for a mixed oxide fuel fabrication plant. In December 2003, the NRC received an application for the National Enrichment Facility to be built in Eunice, New Mexico. This facility is being designed for a capacity of three million SWU per year. NRC developed a 30-month schedule for making a final determination. The Final SER (Safety Evaluation Report) and the EIS (Environmental Impact Statement) were both issued in June 2005. The Atomic Safety and Licensing Board hearing on

safety issues is scheduled for October 2005 with completion scheduled for February 2006. We expect a licensing decision in June 2006.

In August 2004, NRC received the license application for USEC's commercial-scale gas centrifuge facility, the American Centrifuge Plant, which will include the Lead Cascade Facility and is being designed for 3.5 million Separative Work Units (SWU) per year. In October 2004, NRC accepted USEC's license application and environmental report for detailed technical review. Currently, the NRC staff is on schedule to issue the final EIS and SER in early 2006 with an expected licensing decision to follow about one year later.

In March 2005, NRC issued a construction authorization for a Mixed Oxide (MOX) Fuel Fabrication Facility to be located at the Savannah River Site. This facility is to disposition 34 metric tons of excess weapons-grade plutonium through irradiation of MOX fuel in domestic commercial nuclear power plants. In addition, NRC has approved use of MOX lead test assemblies in the Catawba plant.

### Nuclear Plant Safety and Future

The next step of the fuel cycle is power reactors. I already noted the support for new reactors from several sectors. There is considerable optimism now that several utilities are seriously considering new plant construction. But, in any discussion of the potential for new nuclear plant construction, we must always remember that the entire nuclear power industry has a vital job to attend to first – safe and secure operations of existing plants.

The public needs to be confident of this before they will support new nuclear plants. I want to further emphasize the roles of both NRC and the industry in providing adequate protection of public health and safety and the environment with safe and secure operations. In addition, NRC must provide regulatory stability into the future.

First, the industry must maintain a clear focus on safe operations as a means to assure a large margin is maintained against any harmful release of radioactivity from a commercial nuclear plant in the United States. Furthermore, with this focus, and under the watchful oversight of the NRC, the industry must constantly guard against another serious incident like the reactor vessel head degradation encountered at Davis-Besse.

This focus on safety must extend to natural phenomena that could challenge safe operation of plants. For example, I am proud of NRC's extensive proactive planning for Hurricane Katrina to assure that safety was never compromised by the terrible conditions near several of the nuclear plants.

Second, NRC needs to monitor and report on industry's continued safety performance through our various methods, including the reactor oversight process and the generic issues program. In general, industry's safety trends have shown improvements in decreasing the number and severity of events and safety system failures. The reactor oversight process now uses more objective, timely, and safety-significant criteria in assessing performance, while seeking to more effectively and efficiently regulate the industry.

While assuring safety, NRC must also strive for stability of the regulatory environment, that is, maintaining consistency and predictability. Although this can be a challenge, NRC has demonstrated

through programs like the reactor oversight process that it makes predictable regulatory decisions.

Third, security was a key focus of the NRC before 9/11 and has been substantially enhanced since then. Some of the security enhancements are obvious as one approaches any plant perimeter, such as intrusion barriers. Many more changes are less obvious. They reflect improvements in internal operations, procedures, and physical arrangements. They also involve carefully negotiated and tested protocols between the NRC and local, state, and federal responders. In addition to actions of NRC and the licensees, airborne threats are primarily addressed through the operations of the Department of Homeland Security and the North American Aerospace Defense Command, more commonly referred to as NORAD. With these many enhancements, our nuclear plants are even more secure today.

Several vital provisions of the new Energy Bill further enhance plant security. Guards at power plants may now carry more powerful weapons. Federal criminal statutes were expanded to further protect key nuclear facilities and our ability to demand fingerprinting and criminal history checks was expanded.

Fourth, in addition to public assurances on safety and security, nuclear power will not advance unless the industry and the public have confidence that NRC's licensing procedures are well understood, incorporate significant public input, and operate on predictable time scales. NRC's performance on license renewals, power uprates, and new licenses are evidence of our success in this area.

### New Plant Construction

At one time, the United States led the world's development of nuclear energy, but there hasn't been a new construction permit issued here since 1978. That dearth of new plants was driven by several factors, but its impact has been enormous. Our nation's capacity for new plant construction has had limited exercise and has partially atrophied. We are no longer the world's leader in these areas. Today, we have enough remaining infrastructure, both human and industrial, to recover, but may be in danger of losing these capabilities in the not too distant future.

My own view is that the time frame within which we must determine our nation's future capabilities in nuclear energy is at most the next couple of decades. Unless near-term progress is demonstrated in the United States within that time window, which includes construction of new plants, our nation may lose much of our technical capability to support new construction projects using domestic resources. There is no question that today there is more interest in new nuclear power plant construction than at any time in recent history, and a number of companies are now seriously discussing such possibilities.

Historically, the licensing process for nuclear plants allowed construction to start even as technical safety questions were still being addressed, often resulting in extended and costly delays in approving the operating license. In 1989, the NRC established 10 CFR Part 52 which provides for a combined construction and operating license, referred to as a COL. The process also includes the Early Site Permit or ESP process and the Standard Design Certification, which is intended to ensure all safety questions has been addressed prior to major construction. Both the ESP and the design certification may be referenced to simplify an application for a COL.

The overall goal of the COL process is to provide a stable, efficient, and a predictable regulatory framework for utilities that might wish to pursue a new reactor license. At the same time, the NRC has been careful to include appropriate opportunities for public input throughout the parts of the ESP, design certification, and COL processes. I would like to briefly describe each process and give an update on industry interest.

The ESP process allows early resolution of site-related issues and allows an applicant to “bank” a site for future construction. The three key factors that determine site suitability are site safety, emergency preparedness, and environmental protection. The initial permit is issued for 10 - 20 years with renewals issued for an additional 10 - 20 years. Applications have been received for the North Anna, Clinton, and Grand Gulf sites, and the NRC is on track to issue final decisions in 2006 and 2007 for these cases. Southern Company has announced their intent to submit an ESP application.

The standard design certification process allows a vendor to submit a plant design to the NRC for review and certification. The application is independent of a site and the safety reviews are completed based on an essentially complete reactor design. Initial certifications are issued for 15 years with renewals issued for 10 -15 years.

The first standard design certification was issued for the General Electric Advanced Boiling Water Reactor (ABWR) system in 1997. Today three advanced designs are certified, the GE ABWR, System 80+ and AP600. A certification review for the AP1000 is in progress and out for public comment; the ESBWR application was just received for review; and other applications are expected to be filed soon. The NRC has estimated times for completion of a design certification to range from 42 to 60 months depending on the complexity of the design and the extent of its departure from previously certified designs.

The COL application process enables a utility to reference an ESP and a certified design to expedite the process. If both the ESP and design certification are included in the COL application, the review and hearing process for the combined license is anticipated to require less than 30 months.

Currently, several utilities have expressed interest in submitting COL applications, for example:

- A consortium led by Dominion Resources is considering the GE ESBWR design at the North Anna site.
- A consortium led by TVA was scheduled to complete a feasibility study in August for construction of two advanced BWRs at the Bellefonte site. Based on the results of the study, TVA will decide on submitting a COL application.
- The NuStart Energy consortium is considering both the Westinghouse AP1000 and GE ESBWR designs. They have selected six potential sites and currently plan to submit COL applications sometime in 2008.
- Duke, Southern Company, South Carolina Electric and Gas, and Progress Energy have all recently expressed interest in possible COL applications.

One aspect of the COL process which is getting a lot of industrial attention involves verification of Inspection, Tests, Analyses, and Acceptance Criteria (ITAAC). I’ve heard concerns that this verification step could lead to lengthy delays in the final operation of a site, defeating the whole intent of the Part 52 approach.

In my view, as long as the ITAACs are carefully developed and appropriately focused, and as long as the constructed plant fully meets the agreed upon ITAACs, this verification step should not represent any serious delays. But I also recognize that this is an untested aspect of the new Part 52 process that may cause concerns just because it is new. The inclusion of regulatory delay insurance in the Energy Bill should address this concern.

### Storage and Transportation Activities

Spent nuclear fuel storage and transportation activities are extremely important to support the overall national fuel cycle. At the moment, the NRC regulates 30 operating independent spent fuel storage installations. This number has more than doubled from five years ago. Based on current projections, there could be approximately 50 independent spent fuel storage installations by 2010. One indication that this projection is accurate is the continued industry interest in new cask designs. The dry cask storage industry is a maturing industry which is producing robust and safe products.

To date, we have certified 14 cask designs, submitted by five vendors, that are approved for storage of spent fuel. Some of these designs are dual-purpose and are approved for transportation as well as storage. New cask designs are evolving and pushing the technical envelope. Some examples of issues in this area that the staff continues to address are: high burnup fuel thermal issues, allowance for burnup credit, and moderator exclusion for transport.

### High Level waste

Finally, let me turn to the back end of the fuel cycle. There should be no doubt that if we receive the License Application for a repository from the DOE, it will be one of the greatest challenges in the history of NRC. NRC has been preparing for this potential challenge for many years. As an Agency, we believe we will be well positioned to respond within the times specified in the High Level Waste Act.

NRC recently issued a proposed rule for public comment that would amend the regulations governing the disposal of high level waste to be consistent with revised EPA environmental standards for Yucca Mountain high level waste repository. Another possible near-term action may be DOE's certification that the Licensing Support Network has been populated. This certification must precede submission of a license application by at least six months.

NRC's staff is working to ensure that we have the appropriate infrastructure in place to support a potential review. Once the potential application is docketed, NRC would conduct extensive technical reviews, as well as public hearings which would be overseen by the Atomic Safety and Licensing Board. After completion of the hearings, the Board would forward its initial decision to the Commission for review.

NRC is preparing for the anticipated legal proceedings, if a license application is received. One major step we have taken is to establish the Commission Adjudicatory Technical Support Program. This division consists of technical experts that will advise the Commission during its review of the Atomic Safety and Licensing Board's initial decision on the application. These staff members will be independent from that staff performing the initial review of DOE's application. This is necessary to guarantee that the Commission's final decision on the application is impartial and untainted by



improper communications between the Commission and the staff conducting the review of the application.

### Summary

In summary, retaining the nuclear energy option in the future requires continued safe performance of the current operating reactors and continued strong and independent NRC oversight. In addition, it depends on improved security and stable NRC licensing processes with appropriate public input. Meeting these goals in as public a manner as possible, while balancing openness and information security, is absolutely necessary. Well-informed citizens are essential to better understanding operations, risks, and benefits involving the nuclear energy option.

While the industry has demonstrated a strong track record in recent years, it has not been without challenges and opportunities to learn. As an example, both the industry and NRC's staff must learn and institutionalize the important lessons from the Davis-Besse corrosion event – and not just the technical aspects – but more importantly avoiding the underlying complacency and failure to maintain a questioning attitude.

Another challenge for both the industry and NRC is the impending loss of many of our most experienced employees who are nearing retirement, and the attendant loss of the historical and collective lessons that they have learned. It isn't sufficient to just hope that these lessons will have been passed on to younger generations. We must all commit to actively mentoring our less experienced employees to pass on the important values that are essential to continued safe use of the nuclear energy option.

Overall, the industry's performance, as well as NRC's regulatory oversight, will be carefully observed by the public. Only if both the industry and NRC demonstrate strong performance can public confidence be maintained sufficiently to permit an objective and reasoned public dialogue on the future of nuclear energy in this country.